Scientists discover enzyme that could slow part of the aging process in astronauts -- and the elderly

April 30 2012

New research published online in the *FASEB Journal* suggests that a specific enzyme, called 5-lipoxygenase, plays a key role in cell death induced by microgravity environments, and that inhibiting this enzyme will likely help prevent or lessen the severity of immune problems in astronauts caused by spaceflight. Additionally, since space conditions initiate health problems that mimic the aging process on Earth, this discovery may also lead to therapeutics that extend lives by bolstering the immune systems of the elderly.

"The outcomes of this space research might be helpful to improve health in the elderly on Earth," said Mauro Maccarrone, Ph.D., a researcher involved in the work from the Department of Biomedical Sciences at the University of Teramo in Teramo, Italy. "In fact, space conditions [cause problems that] resemble the physiological process of aging and drugs able to reduce microgravity-induced immunodepression might be effective therapeutics against loss of immune performance in aging people. 5-lipoxygenase inhibitors, already used to curb human inflammatory diseases, may be such a group of compounds."

Maccarone and colleagues made this discovery by conducting experiments involving two groups of human lymphocytes that were isolated from the blood of two healthy donors. The first group of lymphocytes was exposed to microgravity onboard the International Space Station (ISS). The second group was put in a centrifuge onboard

the ISS, to have the same "Space environment" as the other group, but a normal Earth-like force of gravity. When programmed cell death (apoptosis) was measured in both groups, the lymphocytes exposed to microgravity showed an increase above what is considered "normal." The group exposed to the simulated Earth gravity showed no unusual differences. Specifically, the researchers believe that this difference is caused by different levels of the 5-lipoxygenase enzyme.

"It's no surprise that bodies need Earth's gravity to function properly," said Gerald Weissmann, M.D., Editor-in-Chief of the FASEB Journal, "because we evolved to survive on this planet. As humanity moves into space and potentially to other planets or asteroids, it's clear that we need know how not only to secure habitable conditions, but also how to secure our health. Fortunately, as we learn how to cope with low gravity environments, we also unlock secrets to longevity back home on Earth."

More information: *FASEB J* May 2012 26:1791-1798; doi:10.1096/fj.11-199406

Provided by Federation of American Societies for Experimental Biology